**DEPARTMENT OF MECHANICAL ENGINEERING**

**COURSE OUTLINE**

Academic Year, Semester: **Monsoon Semester 2019-20**

Subject: **ME3003D THERMAL ENGINEERING I** Slot: **E**

Course Faculty: **Dr. SAJITH V(A Batch)**

**Course Outcomes**

CO1: Analyze ideal and actual cycles for IC engines.

CO2: Acquire knowledge on combustion in IC engines.

CO3: Evaluate performance of IC engines.

CO4: Analyze ideal and actual cycles for gas turbine power plants and jet engines.

**Hourly Course Plan**

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| **Sl. No.** | **Date** | **Module** | **Topics Planned** | **Topics Covered** |
| 1 | 3/9/2020 | Module 1 | Carnot Cycle, Air standard cycles and its assumptions |  |
| 2 | 4/9/2020 | Otto cycle, Diesel cycle |  |
| 3 | 8/9/2020 | Dual combustion cycle, Comparison among these cycles |  |
| 4 | 10/9/2020 | Problems related to various cycles |  |
| 5 | 11/9/2020 | Real air-fuel cycles, engine nomenclature, four stroke SI and CI engines |  |
| 6 | 15/9/2020 | Two- stroke SI and CI engines |  |
| 7 | 17/9/2020 | Valve timing & Port timing diagrams |  |
| 8 | 18/9/2020 | Scavenging (terminologies and methods) |  |
| 9 | 22/9/2020 | Comparison of SI and CI Engines, comparison of two stroke and four stroke engines |  |
| 10 | 24/9/2020 | Tutorial Test-I |  |
| 11 | 25/9/2020 | Module 3 | Analysis and application of gas turbines: open and closed cycles |  |
| 12 | 29/9/2020 | Brayton cycle |  |
| 13 | 1/10/2020 | Regeneration - Reheat and Inter cooled cycles |  |
| 14 | 6/10/2020 | Actual Brayton cycle, Ericsson cycle |  |
| 15 | 8/10/2020 | Ideal Jet – propulsion cycles |  |
| 16 | 9/10/2020 | Modifications to turbojet engines |  |
| 17 | 13/10/2020 | Combustion chambers for gas turbines |  |
| 18 | 15/10/2020 | Tutorial Test-II |  |
| 19 | 16/10/2020 | Centrifugal compressors and Axial compressors |  |
| 20 | 20/10/2020 | Module 2 | Comparison of SI and CI Engines |  |
| 21 | 22/10/2020 | Fuels for IC engines, Stoichiometric air, Equivalence Ratio, ignition limits |  |
| 22 | 23/10/2020 | Combustion in SI engines: stages of combustion, ignition |  |
| 23 | 27/10/2020 | Self-ignition temperature, Ignition lag(delay), |  |
| 24 | 03/11/2020 | Flame propagation, |  |
| 25 | 05/11/2020 | knocking in SI engines, pre ignition, |  |
| **26** | 06/11/2020 | Factors affecting knocking, octane number |  |
| 27 | 10/11/2020 | Combustion in CI engines: stages of combustion |  |
| 28 | 12/11/2020 | Ignition delay, knocking in CI engines |  |
| 29 | 13/11/2020 | Factors affecting knocking, comparison of knocking in SI and CI engines |  |
| 30 | 17/11/2020 | Knocking control, cetane number |  |
| 31 | 19/11/2020 | Electronic fuel injection systems, |  |
| 32 | 20/11/2020 | multi point fuel injection systems |  |
| 33 | 24/11/2020 | Gasoline direct injection system; common rail direct injection system |  |
| 34 | 26/11/2020 | IC engine performance, Constant speed and variable speed characteristics |  |
| 35 | 27/11/2020 | Determination of friction power |  |
| 36 | 01/12/2020 | Performance parameters, measurements, Performance curves of IC engines; heat balance sheet |  |
| 37 | 03/12/2020 | Governing of IC engines |  |
| 38 | 04/12/2020 | Fuel properties, lubricants, air pollution |  |
| 39 | 08/12/2020 | Emission norms; exhaust treatment technologies |  |
| 40 | 10/12/2020 | Fuel and Cooling systems |  |
| 41 | 11/12/2020 | Lubrication & Ignition Systems |  |
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**References**

1. Y. A. Cengel and M.A. Boles, Thermodynamics – An engineering approach, 4th ed. Tata McGraw Hill, 2005.
2. J. B. Heywood, Internal Combustion Engines Fundamentals, McGraw Hill, 2017.
3. V. L. Maleev, Internal Combustion Engines: Theory and Design. McGraw Hill, 1983.
4. M. L. Mathur and R. P. Sharma, A Course in Internal Combustion Engines, Dhanpat Rai Publications, 2005.
5. V. Ganesan, Internal Combustion Engines, 4th ed. McGraw Hill, 2017.
6. H. Cohen, Gas Turbines Theory, 4th ed. Longman, 1996.
7. V. Ganesan, Gas Turbines. Tata McGraw Hill, 1999.

**Evaluation policy**

**Evaluation completed: 30 Marks**

**Quiz :** 15 Marks

**Assignment :** 15 Marks

**Tutorial test :** 20 Marks

**End semester Test : 20 Marks**

**Total : 100 Marks**

**Grading Criteria : Relative**

**SAJITH V**

